

33. The system of claim 27 wherein the center

further analyses the operating data to determine if the given appliance is being used efficiently, and

as indicated, notifies the user the given appliance is not being used efficiently.

REMARKS

We have carefully considered the Office Action dated July 5, 2002, in which pending claims 1-26 are rejected over various combinations of United States Patents 6,236,332 to Konkright; 4,977,394 to Manson and 6,297,742 to Canada et al. In response to the Examiner's objections to the drawings and specification, we have made clarifying amendments to Fig. 1 and the specification. No new matter has been added. The abbreviation NI in Fig. 1 indicates a network interface 37, and not a "non-intelligent appliance" as stated by the Examiner. To avoid further confusion, we have amended Fig. 1 by repositioning various numerals and including the phrase *network interface* in place of the NI abbreviation. The amended drawing is submitted in an informal format, and will be re-submitted as a formal drawing after the Examiner has approved the changes to the drawing. We have also amended and added various claims to more particularly point out the current invention.

The current invention as set forth in independent claims 1, 12 and 24 and the claims that depend therefrom is a system that monitors the operations of household appliances and analyses functional data to determine what attention a given appliance requires to **avoid** a failure of the appliance. When attention is required for the respective appliances, the system contacts the user to inform the user of the required attention.

The system may provide warning and/or alarm messages to the user, depending on the immediacy of the attention required to avoid failure (claims 2, 14 and the claims that de-

pend therefrom). In addition, the system may further analyze the operations of the various household appliances to determine if the given appliance requires other service, e.g., preventative maintenance service, and/or if any other appliances in the household also require service. If so, the system informs the user of particular types of additional services required for the various appliances (claims 3, 13 and the claims that depend therefrom). The servicing of the various appliances can then be handled individually or consolidated, as appropriate.

If the user has a service contract, the system may also arrange the required service for the various appliances in accordance with the terms of the contract (claims 5, 15 and the claims that depend therefrom). In addition, the system notifies the user of preventative maintenance that can be performed by the user and/or arranges for service for the maintenance that is not to be performed by the user (claims 4, 16 and the claims that depend therefrom). Further, the system may determine when an appliance requires replacement and, as appropriate, handle the replacement in accordance with a contract with the user (claims 8, 19 and the claims that depend therefrom).

The system may also analyse the functional data in accordance with appliance settings and statistical and/or historical data to determine if the given appliance is being used efficiently and/or operating in a manner that indicates that the appliance is tending toward failure (claims 3, 7, 10, 18, 21 and the claims that depend therefrom). The system may then send the user information about other types and/or sizes of appliances that are recommended for replacement and/or for more efficient operation, based at least in part on the way in which the user operates the given appliance.

As set forth in claim 25 and the claims that depend therefrom, system may also use the data from various household appliances to determine the environmental conditions in which a given appliance operates. The system may then use the environmental data during the analysis of the functional data from, for example, an adapter, which operates with a non-intelligent appliance and does not have access to sensors that measure the environmental conditions. The system can thus use the environmental information to avoid possible misinterpretation of the data from the adapter.

As set forth in new independent claim 27, the monitoring subsystem may also set alarms, such as blinking lights or LEDs, when user attention is required by a given appliance to avoid a failure of the appliance. For example, the subsystem may cause a refrigerator light to blink when the refrigerator door is left open. If the user does not respond to the alarm signal within a predetermined time limit, in the example by shutting the door, the subsystem then sends an appropriate message to the center, which, in turn, sends an appropriate notice to the user.

The '332 patent describes a control and monitoring system which includes a remote unit that monitors an apparatus by periodically measuring operating parameters, such as the current drawn by an electrical apparatus, to determine if the apparatus is in partial or total failure. If the apparatus has failed, the remote unit produces an alert message, which the unit either retains until polled or sends directly to a host computer. (Column 5, lines 50 et seq.; Column 8, lines 20 et seq.) When the host computer receives the message from the remote unit, the host computer performs a "notification routine," or an "alert notification subroutine." (Column 3, lines 61-65; Column 4, lines 47-51). The '332 patent does not describe the

2(29-43) steps included in the notification routine or subroutine, and thus, it is not clear who is notified of the failure.

The '332 patent does not teach or suggest a monitoring system that monitors the operations of household appliances to determine when a given appliance requires attention to avoid a failure and/or a system that notifies the user when attention is required to avoid the failure of a given appliance, as set forth in the pending independent claims and the claims that depend therefrom. Rather, the '332 patent describes a system that monitors an electrical apparatus to determine when a failure has occurred, and sends messages about the failure to a host computer that, in turn, performs a notification routine or subroutine.

The '394 patent describes an automatic appliance that stores particular information about the operations of the appliance. When the appliance thereafter fails, a service person manipulates the appliance control panel during repair operations in order to retrieve the stored information. The appliance also displays on the control panel, at various times, indications of the current operations of the appliance and/or indications that the appliance requires a service call. If, for example, the appliance lid is opened at an inappropriate time in the operations, the control panel displays an "OL," or open lid, code until the lid is closed. If the operations of the appliance indicate that service is required, the control panel displays a "CS," or call service, code. The displayed codes may also flash, to more conspicuously notify a passing user that the appliance requires attention.

The '394 patent adds to the teaching of the '332 patent the displaying on the control panel of an apparatus various codes relating to the operations of the apparatus. There is no teaching in the combination of a system that includes a remote center which notifies a user

that a given appliance requires attention to avoid failure, as set forth in independent claims 1, 12 and 24, and the claims that depend therefrom.

The '742 patent describes a system in which a monitor determines when an apparatus has an anomalous operating, or fault, condition. The monitor then sets off associated alarms, such as annunciation devices, by sending out signals to the alarms. The alarms are presumably positioned such that they are heard by passing users. The '742 patent thus adds to the combination the sounding of associated alarms when a monitored device fails. The combination of the three patents does not teach or suggest the current invention of independent claims 1, 12 and 24 and the claims that depend therefrom because, *inter alia*, the combination does not teach or suggest a system that monitors the operations of household appliances and contacts a user to inform the user that the respective appliances require attention to avoid failures, as set forth in independent claims 1, 12 and 24 and the claims that depend therefrom.

Further, none of the cited patents alone or in combination teach or suggest a system that performs the two-step notification process set forth in independent claim 27 and the claims that depend therefrom.

The claims, as amended, should now be in form for allowance. We respectfully request that the Examiner reconsider the rejections and issue a Notice of Allowance for all pending claims.

Please charge any fee occasioned by this paper to our Deposit Account No. 03-1237.

Respectfully submitted,

A handwritten signature in cursive script, reading "Patricia A. Sheehan". The signature is written in black ink and is positioned above a horizontal line.

Patricia A. Sheehan

Reg. No. 32,301

CESARI AND MCKENNA, LLP

88 Black Falcon Avenue

Boston, MA 02210-2414

(617) 951-2500

**REPLACEMENT PAGES FOR THE NOVEMBER 22, 2002, AMENDMENT
TO U.S. PATENT APPLICATION SER. NO. 09/761,950**

The replacement for the paragraph that spans page 1, line 14 through page 2, line 5 is as follows:

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The preventive maintenance schedules set by the manufacturers are generally based on average usage, and thus, may not be applicable a given user. The user may, for example, use an appliance more frequently or at a greater capacity than average, and thus, require service at an earlier date or even a different type of service than what is recommended for average use. In addition, environmental conditions such as water hardness, humidity, air flow and so forth may adversely affect the operations of a given appliance. The appliances or components thereof may therefore require replacing or cleaning at an earlier date than recommended by the manufacturer. Accordingly, when the user requests the recommended service may not be arranging for service at the appropriate time. Conversely, if the appliance use is well below average or the environment is particularly well suited to the appliance, the user who requests the recommended service may be arranging, and thus paying for unneeded service.

The replacement for paragraph 2, page 7, is as follows:

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The communications path 40 between the appliances 14, 16, 18 and 20 and the gateway 42 may be over a power line, a dedicated line, a telephone link or a wireless link. The gateway, which includes a modem, may be included in one of the appliances or may be, as shown in the drawing, a separate node on the network 10. The monitoring subsystem 30 may be one of two types, namely, a built-in system 32 that is incorporated into an "intelligent" appliance or an adapter 34 that attaches to a "non-intelligent" appliance.

The replacement for paragraph 1, page 11, is as follows:

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The monitoring subsystem 32 further includes a ROM 226 that contains the software that controls the operations of the processor 33. The ROM 226 may instead be any form of non-volatile memory such as an EE PROM. Under software control, the RAM 224 receives functional data from the sensors over the bus 222 (step 300), and the processor 33 then analyses certain of the data (step 302), to determine parameter values such as the start times and duration of the duty cycles of the compressor and the evaporator, the current drawn when the compressor and evaporator are turned on, the times the door opens and closes, the associated internal and ambient temperatures, the user-selected temperature settings, and so forth. As part of the analysis, the processor aggregates the data and calculated parameter values from several operating cycles into historical data that the system stores in the RAM 224. The subsystem may also compare the data and calculated parameter values from the most recent operating cycle to the historical data and/or to expected data values, to determine if the appliance is operating properly (step 304). If the subsystem determines that the appliance is functioning properly, the subsystem sends the data to the gateway (step 305). If the subsystem determines that the appliance is not functioning properly, the subsystem performs further steps to determine the need for warning messages and so forth as discussed below. Alternatively, the subsystem sends the data to the remote center, which performs all or part of the analysis.

The replacement for the first full paragraph on page 12, is as follows:

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The analysis performed by the monitoring subsystem 32 may also reveal that the associated appliance requires immediate attention from the user (step 314). The subsystem

94 monitoring the refrigerator may, for example, determine that the door 212 has been left open longer than a predetermined maximum time limit. The subsystem first sets off a local alarm in an attempt to alert the user. The subsystem thus causes the refrigerated compartment light 210 to blink and, as appropriate, buzzers (not shown) to sound. Further, the subsystem sends a local alarm message over the network to the gateway 42 and the various other appliances in the household. In response the gateway and the other subsystems and adapters blink indicator lights and/or sound buzzers in a predetermined pattern to alert the user of the condition. The user may respond to the alarm by shutting the refrigerator door. The subsystem then sends a message over the network instructing the gateway and other appliances to turn off the local alarm.

The replacement for paragraph 2, page 12, is as follows:

95 If the user does not acknowledge the local alarm within a predetermined time by, for example, shutting the refrigerator door or otherwise deactivating the associated alarm, the subsystem sends an alarm message to the remote center. The subsystem also sets the corresponding flag to signify that the open-door message was sent (steps 308, 310, 312), such that the condition is not repeatedly reported as the subsystem continues to collect and analyse the data (step 309). As appropriate, the subsystem sends a message to the other appliances instructing them to turn off the local alarm.

The new paragraph added after the last paragraph on page 12 is as follows:

96 If immediate user attention is not required, the subsystem may further analyse the data (step 315), to determine if a warning message is required, as discussed below with reference to Fig. 4.

The replacement for paragraph 2, page 13, is as follows:

97 The monitoring subsystem 32 for the washing machine 18 receives the functional data from the sensors over the bus 222, and analyses certain of the data to determine whether the washing machine is operating properly. The monitoring subsystem 32 thus compares the sensor data associated with the most recent operating cycle with expected values and/or values from past cycles to determine if the washing machine is in danger of imminent failure. In the example, the subsystem compares the values associated with the current duty cycle of the motor 108 with those associated past or expected duty cycles, taking into account the water level and when the door 110 was opened or closed.

The replacement for the first full paragraph on page 14, is as follows:

85 Referring now also to Fig. 4, the analysis performed by the subsystem may also reveal that a critical component is operating poorly but not in danger of imminent failure (step 400). The refrigerator's monitoring subsystem may determine, for example, that the compressor is drawing increasing amounts of current but has not yet drawn an amount that exceeds a level associated with imminent failure. The subsystem 32 checks that the condition has not yet been reported and, as appropriate, sends a warning message that contains a fault code which indicates that the particular compressor requires non-emergency service (steps 402, 404). The subsystem similarly sends a warning message if the statistical data indicates that a preventative maintenance milestone, such as a number of cycles performed, has been achieved. The warning message may, for example, include a maintenance code that indicates that a particular filter should be replaced. After sending the message, the subsystem 32 sets

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the associated flags, to avoid the sending of duplicate warning messages during a subsequent operating cycle (step 406).

The replacement for paragraph 1, page 16, is as follows:

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Based on the results of the analysis, the adapter 34 produces appropriate alarm and warning messages if the appliance is not properly functioning (steps 504, 506, 508, 509, 510, 512, 504, 515). Otherwise, the adapter 34 sends the data to the gateway (step 505).

While the adapter may have access to less overall functional data than the built-in subsystem 32, the data available to the adapter is generally sufficient to determine when the associated appliance is operating poorly or when certain key components have failed. The adapter may not, however, be able to determine the causes of the malfunctions. The adapter also produces historical and statistical data, in the form of various data points from plots of associated energy consumption variables versus time, and sends the data to the remote center for further analysis.

The replacement for the first full paragraph on page 17, is as follows:

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The gateway 42 preferably polls the subsystems when the network is otherwise relatively free, such as late in the day or early in the morning (step 600). The gateway then retains the data returned by the various appliances until a next transmission to the remote center (steps 612, 614).

The replacement for paragraph 2, page 17, is as follows:

911 Referring now to Fig. 7, when the remote center 50 receives a message, the center first determines if the message is an alarm message or a warning message (steps 700, 702, 703). The remote center thus checks the message field in the message header.

The replacement for the paragraph that spans pages 18-19, is as follows:

912 If the appliance is not serviceable, such as a water heater (not shown) with a ruptured tank, the remote center checks its stored user contract information to determine if the user's contract covers appliance replacement (step 720). If so, the remote center informs the user of a need to replace the appliance, and recommends one or more replacement appliances (step 724), based on an analysis of the patterns of use of the appliance, as discussed below with reference to Fig. 9. As appropriate, the remote center also informs the user where he or she may purchase the recommended replacement appliances (step 728). If the contract also includes arranging for the replacement of the appliance, the remote center schedules the delivery and installation of the replacement appliance purchased by the user (step 730).

The replacement for paragraph 3, page 19, is as follows:

913 If the service is not one that is generally performed by the user, the remote center 50 consults stored contract information, to determine if the user has a service contract (step 808). If not, the remote center sends a message to the user regarding the required service (step 810), and the user then has to arrange to have the service performed. Otherwise, the system notifies the user of the required service and arranges a service appointment that is convenient to both the user and the repairman (step 812). The center also preferably determines if that appliance or any other appliance in the household are in need of additional

913 service and, if possible, arranges for these services to be performed during the same service call (steps 814 and 816).

The replacement for the first full paragraph on page 20, is as follows:

914 Further, the remote center can also predict when an appliance is about to malfunction based on an analysis of the operations of the appliance in comparison with other appliances of the same type in other households that report to the center (step 707). For example, the remote center may recognize in a given appliance an operating characteristic that has preceded a particular failure in other appliances of the same type. The remote center can thus schedule pre-emptive maintenance, to avoid the failure of the given appliance (step 709).

The replacement for paragraph 3, page 20, is as follows:

915 Referring now to Fig. 9, the remote center further analyses the data compiled by the appliances to determine patterns of use for the respective appliances (step 900). The remote center then determines if a particular appliance is being used inefficiently in terms of temperature settings, water settings, detergent quantities, and so forth (steps 902, 904). If so, the center recommends more appropriate temperature and water settings and/or detergent use to the user (step 906). If not, the remote center continues to analyse the data provided by the appliances without making any particular recommendations (step 903).

The replacement for paragraph 13, page 21, is as follows:

916 In the example, the remote center analyses information provided by the intelligent washing machine 18 (Fig. 1) to determine the size of a given load, the type of fabric included in the wash, the machine settings selected by the user for the wash, i.e., load size, tempera-

ture, and wash cycle selection, and amount and type of detergent used, and includes this information in the statistical data that is ultimately sent to the remote center. The remote center then analyses the data to determine if the washing machine is both operating properly and/or being used efficiently (steps 902, 904). In the example, the center checks the fabrics washed and the associated machine settings, and determines that the user is washing delicate fabrics at too high a temperature. The remote center then recommends to the user that he or she wash the delicate fabrics at a lower temperature, to prevent harming the fabric and to save energy (step 906).

The replacement for claim 1 is as follows:

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1. A system for servicing household appliances, the system including:
 - A. one or more monitoring subsystems associated with the one or more appliances, each monitoring subsystem
 - i. monitoring the operations of a given appliance and retaining as functional data information relating to the functioning of the appliance,
 - ii. analyzing the functional data and determining if the appliance is in need of attention to avoid a failure of the appliance, and
 - iii. transmitting a message indicating that the appliance requires attention, and
 - B. a center for receiving the messages sent by the monitoring subsystems, the center contacting one or more users of the associated appliances to inform them of the particular attention required by the appliances to avoid failures of the respective appliances.

The replacement for claim 3 is as follows:

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3. The system of claim 1 wherein
- a. the monitoring subsystem sends the functional data or aggregations of the data to the center; and
 - b. the center processes the data to determine if one or more of the appliances requires service in addition to the attention required to avoid failure.

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[The replacement for claim 4 is as follows:]

4. The system of claim 3 wherein the center
- determines, if service is required, whether the user of the one or more appliances has a service contract, and
 - arranges service of the respective appliances in accordance with the provisions of the contract, if the user has a service contract.

[The replacement for claim 5 is as follows:]

5. The system of claim 4 wherein the center further
- determines, if the service required is preventive maintenance, whether the maintenance is of the type performed by the user or by an appliance service person,
 - arranges, if the maintenance is to be performed by a service person and the user has a maintenance contract for the appliance,
 - maintenance to be performed in accordance with the provisions of the contract, and
 - notifies the user what preventive maintenance is to be done if the maintenance is to be performed by the user.

The replacement for claim 7 is as follows:

7. The system of claim 6 wherein

each monitoring subsystem aggregates the functional data over time into statistical data that relates to the operations of the associated appliance, the gateway polls each monitoring subsystem to request the statistical data,

the gateway transmits the statistical data to the center at predetermined times or when other transmissions are made to the center, and

the center includes the statistical data in an analysis of the patterns of use and the operations of the appliances.

The replacement for claim 8 is as follows:

8. The system of claim 7 wherein the center

determines if a given appliance should be replaced based on the associated patterns of use,

recommends at appropriate times the replacement of the appliance with one or more appliance models that fit the associated pattern of use,

determines if the user of the given appliance has a replacement contract, and if so, arranges for the delivery and installation of the replacement appliance model selected by the user.

The replacement for claim 12 is as follows:

12. A method for servicing household appliances, the method including the steps of:

A. monitoring the operations of one or more appliances and retaining as functional data information relating to the functioning of the respective appliances;

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- B. analyzing the functional data at the appliances and determining if the respective appliances are in need of attention to avoid failures;
 - C. transmitting to a remote center one or more messages indicating that respective appliances require attention; and
 - D. from the center contacting the users of the associated appliances to inform them that the respective associated appliances require attention to avoid failure.

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The replacement for claim 13 is as follows:

13. The method of claim 12 further including the steps of
transmitting data from the appliances to the center,
analyzing at the center the data from all of the appliances in the household to determine if one or more appliances requires service in addition to the attention required to avoid failure.

The replacement for claim 14 is as follows:

14. The method of claim 13 wherein
the step of analyzing at the appliance further includes determining if a given appliance requires immediate attention, and
the step of transmitting one or more messages further includes producing alarm messages when immediate attention is required and producing warning messages when other than immediate attention is required.

The replacement for claim 15 is as follows:

15. The method of claim 14 wherein the step of contacting includes
determining, if service is required, whether the user of the appliance has a service contract for the appliance, and

arranging service in accordance with the provisions of the contract, if the user has a service contract.

[The replacement for claim 16 is as follows:]

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16. The method of claim 15 wherein the step of contacting further includes determining, if preventive maintenance is required, whether the maintenance is performed by the user or an appliance service person, determining, if the maintenance is to be performed by a service person, whether the user has a maintenance contract for the appliance, arranging the maintenance to be performed in accordance with the provisions of the contract, and notifying the user what preventive maintenance is to be done if the maintenance is to be performed by the user.

[The replacement for claim 17 is as follows:]

17. The method of claim 13 wherein the steps of transmitting include transmitting the messages and data over a network to a gateway, transmitting alarm messages and associated data from the gateway to the center as soon as the messages are received by the gateway, and retaining warning messages and data at the gateway and transmitting the retained messages at predetermined times or when other transmissions are made to the center.

[The replacement for claim 18 is as follows:]

18. The method of claim 17 wherein

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the step of analyzing further includes aggregating the functional data over time into statistical data that relates to the operations of the associated appliance,
the steps of transmitting further include polling from the gateway to request the statistical data and other data and transmitting the requested data to the center at predetermined times or when other transmissions are made to the center, and
the method further includes the step of including the statistical data in an analysis of the patterns of use and the operations of the appliances.

[The replacement for claim 19 is as follows:]

19. The method of claim 18 wherein the method further includes the steps of
determining if a given appliance should be replaced based on the analysis of patterns of use,
recommending replacement appliance models that fit the associated pattern of use,
determining if the user of the given appliance has a replacement contract, and if so, arranging for the delivery and installation of the replacement appliance model selected by the user.

The replacement for claim 23 is as follows:

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23. The method of claim 22 further including the steps of
transmitting the functional data to the remote center;
analysing the data at the remote center to determine if the one or more appliances are in need of attention.

[The replacement for claim 24 is as follows:]

24. A system for servicing household appliances, the system including:

- A. one or more monitoring subsystems associated with the one or more appliances, each monitoring subsystem
- i. monitoring the operations of a given appliance and retaining as functional data information relating to the functioning of the appliance,
 - ii. analyzing the functional data and determining if the appliance is in need of attention to avoid a failure, and
 - iii. transmitting a message indicating that the appliance requires attention and the associated data,
 - iv. periodically transmitting the functional data,
- B. a center for receiving the messages and the data sent by the monitoring subsystems, the center analyzing the messages and the data and contacting the users of the associated appliances to inform them of the attention required by the respective appliances to avoid failures.

[The replacement for claim 25 is as follows:]

25. The system of claim 24 wherein the center analyses the data from all of the appliances in the same household to determine changes in operating environment and uses the results in an analysis of the operations of the various appliance in the same household to determine if attention is required.

[The replacement for claim 26 is as follows:]

26. The system of claim 24 wherein the center analyses the data from a given type of appliance in the various households that report to the center and uses the results in an analysis of the operations of that type of appliance in each of the households to determine if attention is required.